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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Serial No.: 09/635,968

Group Art Unit: 2828

Filed: August 10, 2000

Examiner: Cornelius H. Jackson

For: **SINGLE MODE, SINGLE LOBE SURFACE EMITTING DISTRIBUTED  
FEEDBACK SEMICONDUCTOR LASER**

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Patent and Trademark Office, Washington, D.C. 20231 on August 22, 2002.

Harry C. Engstrom

(Name of applicant, assignee  
or Registered Representative)

(Signature)

August 22, 2002

(Date of Signature)

**AMENDMENT AND REPLY**

Commissioner for Patents  
United States Patent and Trademark Office  
Washington, D.C. 20231

Dear Sir:

In reply to the Patent and Trademark Office Action of April 24, 2002, after entry of the accompanying petition extending the time for reply to August 26, 2002, please cancel Claims 13-26 without prejudice and amend the claims to read as follows:

27. (Amended) A surface emitting semiconductor laser comprising:

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B/ (a) a semiconductor structure including a substrate and an epitaxial structure on the substrate, the epitaxial structure including a layer with an active region at which light emission occurs, an upper cladding layer above the active region layer and a lower cladding layer below the active region layer to surround the active region layer, the semiconductor structure having an upper face, a lower face, and edge faces that terminate the semiconductor structure longitudinally, and electrodes at the upper and lower faces by which voltage can be applied across the epitaxial structure and the substrate;

(b) a distributed feedback grating incorporated with the epitaxial structure and terminating longitudinally at ends thereof, comprising periodically alternating grating elements to provide optical feedback as a second order grating for a selected effective wavelength of light generation from the active region, the grating having a spacing between adjacent grating elements at a position intermediate the ends of the grating that corresponds to a selected phase shift in the grating, the grating formed and positioned to act upon the light generated in the active region to produce lasing action and emission of light from at least one of the upper and lower faces; and

(c) distributed Bragg reflector gratings incorporated with the epitaxial structure and adjacent to each of the longitudinal ends of the distributed feedback grating to reflect light back longitudinally to the distributed feedback grating.

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32. (Amended) The semiconductor laser of Claim 27 wherein the electrodes are formed on the upper and lower faces of the semiconductor laser and the upper electrode is formed on a cap layer to define an active stripe width over the active region layer at which light emission occurs.

New formal drawings are submitted herewith to substitute for the informal drawings as filed.

### REMARKS

In the Office Action of April 24, 2002, Claims 13-21 and 23-43, all of the claims remaining in the application, were rejected under 35 U.S.C. § 112, second paragraph. These claims were also rejected under 35 U.S.C. § 102 or § 103.

Applicants respectfully request that the rejection under §112 be withdrawn because the structural relationship of the elements is clearly set forth in the claims. The first structural relationship questioned in the Office Action is how the upper and lower cladding layers surround the active layer. The upper and lower cladding layers are part of the epitaxial structure, such cladding layers are a well known feature of semiconductor lasers, and must be above and below the active region layer to surround it. A question was also made to what is considered to be the upper, lower, and edge faces. Such terms are structural features of any laser diode, and are further clearly understood and defined from a reading of the specification of the application. Another question was raised with respect to where the electrodes and distributed feedback grating are positioned within the structure. Again, electrodes are conventional elements of laser diodes and were specified as "electrodes by which voltage can be applied across the epitaxial structure in the substrate," clearly defining the relationship between the electrodes and the epitaxial structure and substrate in order to apply voltage across